ARMY T&D CAPABILITIES

RONALD M. CIONCO
US Army Research Laboratory
Adelphi, MD

ARMY LABORATORIES

LAB/ORG	DEVELOPER	USER
ARMY RSCH LAB	X	X
W DESERT TEST CTR	X	X
NUC/CHEM AGENCY	–	X
SOLDIER CB COM	X	X
CHEM SCHOOL	–	X
FORCES COM	–	X
CSEPP	–	X

ARMY RSCH OFFICE — **SPONSORS RESEARCH IN INNOVATIVE MODELING APPROACHES FOR FOLLOW-ON RESEARCH AT THE LABS**

PURPOSE AND USE OF MODELS

TRANSPORT MODELS: MICRO, BDY LYR, MESOSCALE
- METEOROLOGICAL ANALYSIS AND FORECASTS FOR THE BATTLEFIELD ENVIRONMENT – PRIMARILY TO DRIVE DIFFUSION MODELS

DIFFUSION MODELS: ALL SCALES
-- TO ANALYZE AND PREDICT THE NEAR FIELD AND DOWNWIND MOVEMENT AND BEHAVIOR OF AEROSOLS CLOUDS OF CHEMICALS, BIOLOGICALS, SMOKE, OBSCURANTS, DUST PARTICLES, NUCLEAR, ANDTHE 'FOG OF WAR'

AS WELL AS SUPPORT FIELD TESTING, FIELD STUDIES, TRAINING, SIMULATIONS AND MORE

CAPABILITIES

TRANSPORT MODELS:

- MESOSCALE, BOUNDARY LAYER, MICROSCALE
- FORECASTING, NOWCASTING, DIAGNOSTIC
- DOMAINS: 400KM^2, 40KM^2, 5KM^2, 2KM^2, (X,Y)
- GRIDS: 10KM, 5KM, 2.5KM, 1KM, 100M, 50M
- DIURNAL AND 2-3 HR FORECASTS AND 'NOW'
- COARSE TERRAIN EFFECTS WITH SURFACE PARAMETERIZATIONS
- BOUNDARY LAYER TERRAIN EFFECTS
- SURFACE LAYER HI-RES TERRAIN AND MORPHOLOGY EFFECTS (VEGETATION, BUILDINGS, AND SIMPLE SURFACES)

CAPABILITIES

DIFFUSION MODELS:

- GAUSSIAN PLUME OVER FLAT TERRAIN
- GAUSSIAN PUFF OVER COMPLEX TERRAIN
- GAUSSIAN PUFF OVER CANOPIES/BUILDINGS
- AERIAL SPRAY ABOVE/INTO FORESTS
- OPEN BURNING/OPEN DETONATION BEHAVIOR
- SECONDARY SURFACE EVAPORATION

ROUTINELY USE MODELS DEVELOPED BY OTHERS:

- VAPOR, LIQUID, SOLID AEROSOLS
- SECOND ORDER CLOSURE ANALYSIS
- URBAN DIFFUSION ANALYSIS
- DUST BEHAVIOR

MODELS MATRIX

	TRANSPORT	DIFFUSION	
ARMY:	HRW/CCSL	*D2-PC	FSCBG
	3DSTAT	OBODM	DUST
	BFM	TTURB	NUSSE-X
	NBFM	AADISP	
	(IMETS)		

OTHERS WE USE:	*MM5	*SCIPUFF	HPAC
	RAMS	RIMPUF	UDM
		VLSTRACK	
		SCREEN	

* OPERATIONAL MODELS

TECHNICAL BARRIERS

THE STABLE BOUNDARY
LINKING MICROSCALE TO MESOMODELS
LINKING DIFFUSION MODELS TO MESOSCALE
DIFFUSION WITH MICRO EFFECTS OF MORPHOLOGY
(VEGETATION AND URBAN EFFECTS)
DEVELOP FAST, EFFICIENT METHOD TO GENERATE
MORPHOLOGY DATA SETS FOR T&D USAGE
MICROSCALE FOR BIO-DETECTION/FALSE ALARMS
MICROSCALE FOR CHEMICAL CORP TRAINING
IMPROVE CSEPP D2-PC WITH BETTER MICROMET

ADDRESSING TECHNICAL BARRIERS

PARTICIPATING IN SBL FIELD STUDIES
IN PROCESS OF LINKING MICRO- TO MESOMODEL
LOOKING TO DTRA TO EVALUATE THEIR MODELS
HAVE T&D CODES FOR DIFFUSION OVER
VEGETATIVE AND URBAN CANOPIES
– WORKING THROUGH TTCP - CBD GROUP TO
EXPEDITE THE UK URBAN DIFFUSION MODEL
HAVE SEMI-AUTOMATED THE MANUAL METHOD
- PURSUING START OF AN SBIR FOR AUTOMATION
HAVE PROVIDED T&D CODES -WAITING FOR ECBC
TO DO SOME EVALUATION
CHEM SCHOOL USING HPAC, VLSTRACK AND IMETS
CSEPP IS DEVELOPING A NEW MODEL
ARO IS SPONSORING 2 DIFFUSION MODEL STUDIES

FINAL POINTS

SHARING MODELS: BEFORE SCIENTIFIC PRODUCTS CAN BE SHARED OUTSIDE OF DA, THE MODEL MUST BE CERTIFIED AND PROCESSED FOR PUBLICRELEASE

- **D2-PC IS OUR ONLY CERTIFIED MODEL**
- **THE OTHERS ARE BEING TESTED, EVALUATED, OR UNDER DEVELOPMENT**
- **SOME ARE IN BETA TESTING MODE**

THE ARMY LABS ALSO HAVE:

- **EXCELLENT FIELD TEST FACILITIES**
- **SPECIALIZED AND TRADITIONAL SENSORS**
- **NUMEROUS HIGH QUALITY METEO, DIFFUSION, SOURCE CHARACTERIZATION AND LAND FEATURE MORPHOLOGY DATA BASES**